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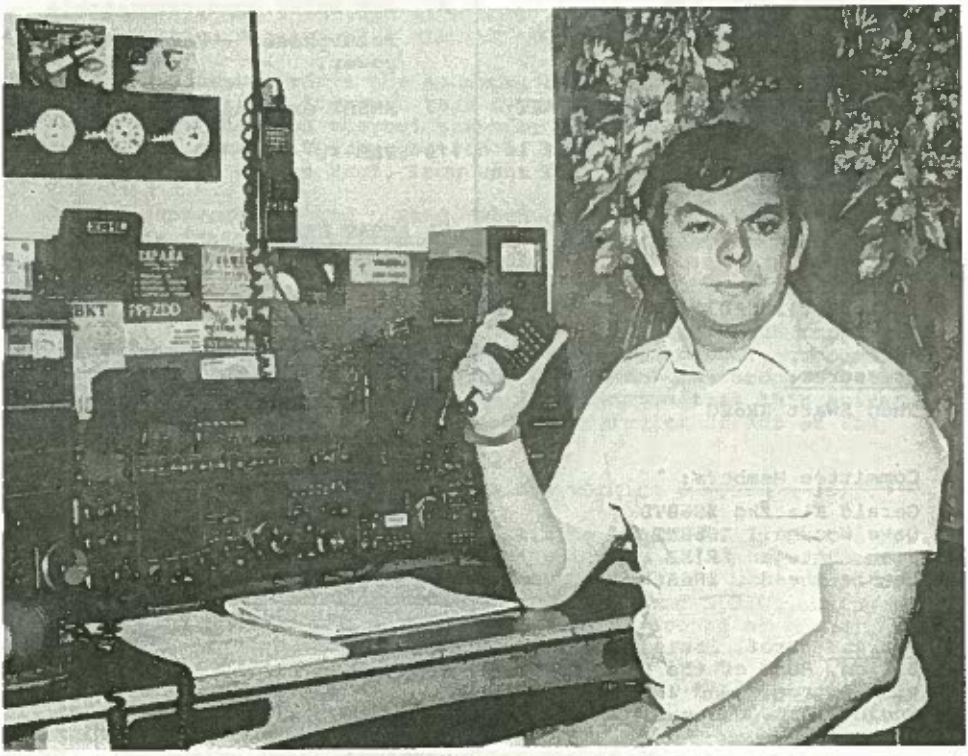

OSCAR 10
IS ALIVE AND WELL

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SA AMSAT NETS

Sundays	09h00 UTC		14,280 MHz
			7,080 MHz
			3,720 MHz
Thursdays	19h30 SAST	145,750 MHz	CT
	20h30 SAST	145,650 MHz	JHB
	19h30 SAST	145,600 MHz	Ntl
	19h30 SAST	145,650 MHz	Ntl

International Net

Sundays	19h00	14,282 MHz

SATELLITE EXPERIMENTERS' HANDBOOK

Members:	...	R25-00, incl.
Non-Members:	...	R27-50, incl.

MEETINGS:

SA AMSAT meets in Johannesburg on the third Wednesday of the month at 20h00. For meetings in other centres, please tune into the bulletins.

THE HISTORY OF SA AMSAT'S CONTRIBUTION TO THE OSCAR SATELLITE PROJECT.

HENNIE RHEEDER ZS6ALN

AMSAT's ambition to build a satellite was partially realised when SAT, USA, approached us to design and construct an S and L Band com-nation for Phase 3C.

e first antenna built was designed by Prof. Wynand Louw of the De-rtment of Electronic and Computer Engineering at the University of etoria. This was a planar antenna. The performance at S Band was ry satisfactory and a horizontal planar array was envisaged. Very od communication via telemail ensured quick feedback from AMSAT.

SAT was very interested in the concept, but unfortunately it turned t not to be practical to mount this type of antenna on a satellite, e reason being that the thermal transfer of the satellite skin will adversely affected. The suggestion of having one helix inside the her was followed up and Prof. Louw went back to the drawing board.

o helices were made, S and L Band, with opposite polarization - the Band antenna inside the L Band antenna. The coupling between the two r 1269 and 2,4 GHz was less than -20 dB.

erything seemed fine until a radiation pattern was plotted. The maxi-m gain of the L Band antenna seemed to be 11 dBi with 1 dB ripple for rcular polarization, as was expected. Problems, however, cropped up midband frequencies. The gain of the L Band antenna dropped by 2 dB d the S Band by as much as 10 dB. It is suspected that this arises om mutual interference of the antennas with greater effect at the gher frequencies.

e exercise was very worthwhile, as we are working on virgin soil!

e S Band helix was removed and the remaining L Band helix tested for e on both bands. The results were disappointing and unsatisfactory. helix was then specially designed and built for broad band purposes. is helix antenna proved well matched for both L and S Band, using a ngle feedpoint. Again the polar radiation plot proved us wrong! The ecified gain, greater than 10 dBic, was never reached.

cause of the tight schedule for Phase 3C, a back-up S Band helix was ilt and tested at the same time. This antenna had an 11 dBic gain d a reflection co-efficient of -18 dB or VSWR of better than 1,5:1 at 4 GHz. The design specification called for 15 dB gain. Adjustments ve been made to the design and a final unit is being built. The 11 unit was despatched to AMSAT for their comments. Some minor mechani-l changes were suggested.

r an L and S Band combination antenna, we are persevering and inves-gating a tapered helix design. It must be borne in mind that a 2m/70 omni-directional antenna has to be accommodated inside this combina-on.

would like to record our sincere appreciation to the Department of ectronic and Computer Engineering, University of Pretoria, for their pport.

BRAIN SURGERY SUCCESS!

AO-10 RETURNS TO SERVICE

Recovery efforts aimed at restoring AMSAT OSCAR 10 to service met success on July 15, when the Mode B transponder was enabled for limited use. This favourable development capped two months of intensive work by spacecraft engineers and controllers. It marked the culmination of a process of subtle diagnostic testing, re-writing the IHU software and cautious evaluation of the results.

AO-10's computer memory had been showing evidence of accumulating radiation damage for nearly a year. The error correcting software 'hit' counter had been incrementing regularly. Last autumn the first major 'hard' failure became evident, but the software was able to accommodate it. On May 17, the quantity and location of errors in the IHU memory overwhelmed the error correction mechanism and caused the operating system to 'crash'. This took AO-10 off the air in what most users considered an unexpected shock. At the time the situation looked bleak; controllers were able only to reset the IHU with the master reset command. Ominously, they were unable to gain a foothold in reloading the IPS operating system.

Karl Meinzer DJ4ZC, the principal architect of the IPS operating system, designed a memory diagnostic package, which produced a memory map of the failed and marginal memory cells. The memory map proved to be a veritable road map to AO-10 recovery. Based on this chart of the affected memory areas, Karl was able to rewrite the IPS operating system so as to avoid the affected zones. To reduce the probability of errors from marginal areas, the refresh cycle was shortened. Ian Ashley ZL1AOX, working with Karl, soon reported that the new IPS-C4 package seemed to be working. The IHU wasn't crashing as it had been.

By about July 12, the decision had been made to turn on Mode B beginning on July 15. This was done with a reduced operating schedule put into effect. That schedule was replaced by a more liberal one. At press time the new AO-10 schedule was:

Mode B	MA	075 thru 119
Mode L	MA	120 thru 136
Off	MA	137 thru 074

ZL1AOX was planning to reorient the satellite beginning July 15 and continuing through about July 19 or 20. This will prepare the satellite for seasonal changes in sun angles and insure proper orientation. Had this reorientation not been accomplished, using the new IPS-C4, by late summer AO-10 would have been in very dire straights due to reduced sun angle and consequent reduced electrical energy.

The overall situation on AO-10 is now stable and generally favourable. Following reorientation, an increased operating schedule may be implemented. However, due to the reduced memory capacity, it will no longer be possible to support the CW and RTTY telemetry sections of telemetry. Bulletins henceforth will be sent in PSK 'M' blocks.

The amateur satellite community welcomed the news of AO-10's return with broad applause and admiration for the superb efforts of those who first fathomed the problem and then applied the highest skills in developing work-around methods. SA AMSAT congratulates all those who worked on the problem and in particular DJ4ZC and ZL1AOX on their brilliant work! Thanks also go to WOPN, KA9Q, WD4FAB, W2FPY and W3GEY.

RUDAK

by Peter Guelzow DB2OS,
Deputy RUDAK Project Leader,
translated by Don Moe, KE6MN/DJOHC

UDAK' stands for 'Regenerative Umsetzer fuer Digitale Amateur Kommuni-
tion' (in English: Regenerating Transponder for Digital Amateur Com-
nications), and is comparable to a so-called digipeater (Digital Re-
ater). Digipeaters are terrestrial relay stations for packet radio and
rform the task of relaying digital information between two stations,
case there is no direct path between them. The transmission occurs
packets (therefore the name packet radio), whereby the actual infor-
tion is supplemented with a frame, which contains in particular the
llsigns of the sending and receiving stations, and also an entire set
additional entries, which are necessary for forwarding and error hand-
ng. Packet radio makes possible a virtually 100 percent error-free
ansmission of information. The exact contents of these packets were
ternationally established using the so-called AX 25 protocol.

milar to analogue transponders, it seems desirable to install such
digipeater at the highest possible location with a large coverage area
r example, aboard a satellite in earth orbit. Thanks to the highly
liptical orbit of Phase 3C, RUDAK should eventually enable the inter-
nnection of several local area nets in addition to point-to-point con-
cts between radio amateurs in the entire world. Naturally a relay
ation with such a large coverage area has to contend with a series of
fficulties. For example, the problem of multiple unco-ordinated ac-
ss, or the selection of optimal modulation techniques are only two
at could be mentioned. These and other problems are to be researched
imarily with the help of RUDAK, with the goal of developing suitable
chniques and protocols, which will benefit future projects.

atus of the hardware development

ter the initial designs of the RUDAK experiment were determined at a
rking meeting at AMSAT-DL in Marburg, West Germany, in February 1985
resent were DJ4ZC, DJ5KQ, DK1YQ, DB2OS, DL3AH), then in 1985, once
ain in Marburg, the entire hardware design, the IHU interface as well
the satellite interface were presented and, after certain alterations,
ttled upon (present were DJ4ZC, DJ5KQ, G8DQX, DK1YQ, DB2OH, DL3AH,
8CA, DG2CV, DL2MDL, DJOHC/KE6MN, DF7ZE), the first functional wire-
ap prototype, RUDAK #1, was then unveiled on the 6th and 7th Septem-
r. At this meeting, likewise in Marburg, the primary task was to in-
grate the programming language IPS, developed previously by Dr Karl
inzer, into the RUDAK processor. After several software errors were
iminated, IPS-CR was at last successfully loaded into RUDAK at 2.30 am
tnessed by DJ4ZC, DJ5KQ, G8DQX, DK1YQ, DB2OS, DL2MDL and DG2CV. The
ccessful implementation of the IPS system brought the RUDAK experiment
giant step closer to completion.

e first printed circuit version, RUDAK # 2, supplemented the original
re-wrap version a short time later. In all, the plan calls for four
uble-sided circuit boards with plated-through holes with the dimen-
ons of 290 x 180 mm. Two boards will be built as identical flight
rsions, with one serving as a reference model on the ground. The ot-
r flight version will be mounted together with the demodulator and the
wer supply, in a two section housing with the dimensions of 300 x 200
20 mm and 300 x 200 x 17 mm, and subsequently integrated into the
ase 3C satellite. The remaining circuit boards are reserved for soft-
re development and various tests, such as radiation testing.

The boards were laid out using a CAD/CAM system.

The hardware development of the RUDAK processor is thereby completed. The main work now involves the completion of the flight version, as well as the implementation of the AX 25 protocol.

On the 24th and 25th January, the RUDAK group met once again in Marburg to clarify remaining details regarding the integration into the satellite. A further high point was the demonstration of RUDAK's possibilities. For the first time, four TNC-1's were linked together via the RUDAK processor, simulating on hard-wire connections how the operation will later take place. TAPR TNC-1's were used exclusively, though only one had the original TAPR software; the other three used the multi-connect firmware from WA8DED. A lively data exchange took place and Karl DJ4ZC made his first packet radio QSO. Additionally, RUDAK transmitted some general information in beacons. As was to be expected, numerous collisions occurred. Even so, RUDAK demonstrated that it already was working correctly.

Details about the RUDAK hardware

The RUDAK hardware consists of 25 integrated circuits and only two discrete transistors. The entire circuitry was realised using CMOS technology, so that the power consumption is only 300 milliwatts. The heart of the RUDAK processor is the CMOS version of the 6502 CPU, which is clocked at 800 kHz. For storage of the RAM resident system software and data, 56KB of static CMOS RAM chips are provided. This concept itself gives RUDAK greater flexibility, for example, in case the entire RUDAK software has to be updated due to changes in the protocol, as has already been practised with OSCAR-10's IHU, a single 2KB fusible link CMOS PROM is used to load the IPS system via the command link after power on. Additionally, the boot PROM contains various programs, which will perform tests of the entire hardware in the RUDAK processor while in orbit.

To communicate with the outside world, the RUDAK processor has various parallel and serial input/output ports. One serial line and one 8 bit parallel port with the appropriate control lines are used for communication with the IHU. In the start-up phase, these paths are used to transfer diverse command and diagnosis instructions. Later on using this same path, RUDAK can receive current telemetry data, which can be processed further. The IHU can also use a portion of the RUDAK memory as virtual memory in which to store larger quantities of data, e.g. RTTY/PSK bulletins. The capacity of the 16KB RAM in the IHU is already totally used up.

Normal operation with the ground stations is handled by the RUDAK packet port. One send and one receive channel are available. The heart of this port is the CMOS version of the Z80-SIO, a universal chip which supports the AX 25 protocol in addition to asynchronous and synchronous operation.

An independent receiver in the Mode L transponder is provided for the RUDAK uplink on 1269,675 MHz. The demodulator converts the 2400 bps bi-phase PSK signal into a clean digital signal for the RUDAK processor. Thanks to the sweep circuit in the demodulator, the uplink signals only have to be in the capture window, within plus-minus 7,5 kHz of the centr frequency.

n the downlink side, the output data modulates the RUDAK beacon transitter in the L-transponder on 435,675 MHz, using BPSK at a data rate f 400 bps, the same as for the general beacon of OSCAR 10. Experimenally, the rate can be increased to 1200 bps using NRZI modulation.

short note regarding the modulation methods used: The 2400 bps upink and the 400 bps downlink signals are generated, using the AMSAT tandard just the same as for the general beacon of AO-10. In the MSAT standard, the data bits are transmitted differentially, i.e. a ogical '0' is sent when there is no change in two successive bits, hereas a logical '1' is sent for a change between bits. Additionally, he clock signal is combined with this data stream. Due to this trick nd the differential encoding, the design of the decoder is signifiantly simplified. Unfortunately, another standard has established itelf internationally, in which the assignment of the logical levels is xactly reversed. In the NRZI standard, a logical '1' is transmitted hen there is no change between bits. If the bit clock is also combined ith the data, the signal is then called 'NRZIC'. In order to reduce he confusion as much as possible, it was decided to adopt the previous MSAT standard for RUDAK. In the case of the 1200 bps downlink option, he NRZI standard was chosen, and in contrast to the AMSAT technique, he clock signal is not combined with the data, since otherwise the ignal would exceed the bandwidth of the SSB receiver.

equirements for the ground stations

n the initial stages, RUDAK will emulate the existing digipeater unctions as they are defined in the AX 25 protocol Version 2. No mailox operation is planned presently, though various other messages, such s bulletins, orbital data, telemetry values and user instructions, can e cyclically transmitted when no uplink signals are being digipeated. ew ground stations can take their time in adjusting their receiving quipment. Additionally a robot-type operation is planned, in which the round stations 'connect' to the satellite and are assigned a consecuive number. In a fashion similar to the RS satellites, a RUDAK command tation could later download the list and send out QSL cards. It is alo hoped that an overview of packet radio activity worldwide could be hereby obtained. Should a suitable link-layer level 3 protocol subseuently become available, it could possibly be implemented.

or the majority of the terminal node controllers, e.g. TAPR TNC-1, AEA KT-1 or Heath HD-4040, the only software modification required is an pdated EPROM to handle a hardware bug in the WD1933/35 HDLC controller. therwise only a PSK modem for 400/2400 bps has to be connected to the xternal modem jack in the TNC. Other TNC's such as the Kantronics Packet Communicator' or various software solutions are unfortunately ot suitable due to the software and/or hardware restrictions. The TNC ust be capable of operating full-duplex at different transmit/receive aud rates and support the connection of an external modem.

esides the normal equipment, a so-called 'RUDAK User Interface' is reuired, which is under development by the RUDAK group and AMSAT-DL. he RUDAK User Interface consists of an upconverter, which translates 2m signal to 24 cm and modulates the carrier with 2400 bps BPSK, and lso the 'AMSAT-AFREG', the BPSK demodulator for the 400 bps downlink. dditionally various buffers and controls for switching the different ignal paths and a power supply are needed. The various schematics, eecially for the AMSAT-AFREG and the upconverter, will be published by MSAT-DL after the design is completed.

n the RF side of the ground stations, the 400 bps downlink signal on 35,675 MHz should provide a signal strength of 12 dB Eb/No to an antena with 10 dBi gain, and for the uplink on 1296,675 MHz, 12 watts (11 BW) into a 15 dBi antenna should be sufficient.

SOUTHERN AFRICA AMSAT

SPIRIT OF ACHIEVEMENT AWARD

.0 The name of the award will be "SOUTHERN AFRICA AMSAT SPIRIT OF ACHIEVEMENT AWARD".

.0 The "Spirit of Achievement Award" is made to an individual who has made a significant contribution to achieve the goals and mission of SA AMSAT. He or she will be honoured for his/her service through technical innovation and commitment to Amateur Satellite and SA AMSAT activities.

.0 Recommendations for the award:

.1 The award will be made to a member on recommendation of

.1.1 at least three members, or

.1.2 the Committee,

provided all awards are approved by the Committee and that 75% of Committee members present and voting should be in favour of such award.

.2 Recommendations are to be properly documented to enable the Committee to consider all the relevant information.

.3 Recommendations should be submitted to reach the Committee not later than 31 July annually. (31st AUGUST FOR 1986 AWARDS.)

.0 The award may be made to a non-member, provided 100% of members of the Committee are in favour of such an award.

.0 Not more than four awards will be made in any one year, of which not more than one award will be to a non-member.

6.0 The award will not be presented for operating achievement for which other awards or certificates are available.

7.0 The award will be made in recognition of:

7.1 Outstanding service/s in promoting the goals of SA AMSAT.

7.2 Unselfish assistance or service/s in the field of SA AMSAT's activities rendered to fellow members.

7.3 Actively promoting SA AMSAT or an activity of SA AMSAT.

7.4 Contributing to a positive learning atmosphere in the Association through some form of activity.

7.5 Notable and significant contribution to the development of any aspect of SA AMSAT related technical activities.

7.6 Superior technical innovation or achievement within the field of Amateur Satellite and Amateur Space technology.

7.7 Some other outstanding service/s in the cause of SA AMSAT.

8.0 Awards will be presented at the Annual General Meeting.

NOTICE TO ALL TAPR/CLONE

HF PACKET USERS

inted from PSR
terly, April 1986

by Dan Morrison KV7B and
Eric Gustafson N7CL

ıtly Eric Gustafson N7CL and I re-examined the 300 baud HF modem de-
lator circuit and concluded that the main reason people have diffi-
/ tuning in HF packet with the standard 300 baud modem is that it
s too critically. We have come up with what we think should be very
e to the optimal performance of the 2211 demodulator circuit.

ıange the standard 300 baud demodulator circuit to this improved
ion, locate header U34 on TNC1 and U19 on TNC2. The standard 300
version of this header contains a 226K resistor and a 510K resist-
These should be replaced by 180K and 750K, respectively. The re-
of these changes is that the tuning range should open up from about
z to around 50 Hz. Thus, you should experience reliable demodulation
the frequency tuned is within plus or minus 20 Hz or so of the true
ıl frequency.

:ge all HF packeteers using TAPR TNC's (original or clone boards) to
these changes as soon as possible. We also remind everyone that HF
ecoming alarmingly crowded and that, unless sensible operating
:ice is followed, the channel will be useless. Some suggestions con-
ing HF operation are:

Try to keep all packets below 80 characters in length.

Set MAXFRAME to 1. This will minimize transmission time.

Avoid multiple connections and digipeated packet operation.

QSY away from the standard calling frequencies as soon as possible.

Set FRACK to a sensibly long value.

ope these modifications improve matters on HF and would VERY GREATLY
eciate hearing from any of you who make this modification and are able
ompare the new behaviour to the previous behaviour.

Morrison KV7B
Gustafson N7CL

AS-ONE LAUNCH

RE-Launch Net

:h August 20h00 SAST 3720 7080 KHz

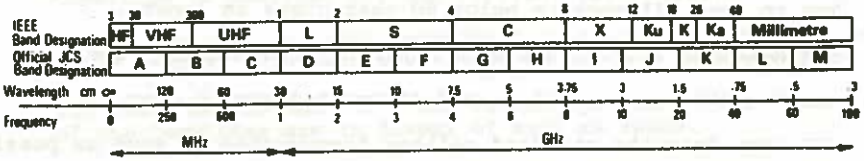
AUNCH NET (including live coverage)

:h August 22H00 SAST 3720 7080 KHz

dBm - WATTS CONVERSION TABLE

dBm	P_o	dBm	P_o	dBm	P_o	dBm	P_o
+50	100W	+35	3.2W	+20	100W	+5	3.2mW
+49	80W	+34	2.5W	+19	80mW	+4	2.5mW
+48	64W	+33	2W	+18	64mW	+3	2.0mW
+47	50W	+32	1.6W	+17	50mW	+2	1.6mW
+46	40W	+31	1.25W	+16	40mW	+1	1.25mW
+45	32W	+30	1.0W	+15	32mW	0	1.0mW
+44	25W	+29	800mW	+14	25mW	−1	.80mW
+43	20W	+28	640mW	+13	20mW	−2	.64mW
+42	16W	+27	500mW	+12	16mW	−3	.50mW
+41	12.5W	+26	400mW	+11	12.5mW	−4	.40mW
+40	10W	+25	320mW	+10	10mW	−5	.32mW
+39	8W	+24	250mW	+ 9	8mW	−6	.25mW
+38	6.4W	+23	200mW	+ 8	6.4mW	−7	.20mW
+37	5W	+22	160mW	+ 7	5mW	−8	.16mW
+36	4W	+21	125mW	+ 6	4mW	−9	.125mW
						−10	.10mW

COMMON USAGE FREQUENCY BAND NOMENCLATURE



POLARPHASER - HARNESSES YOUR POWER

ɔe POLARPHASER matches two 50 Ohm feeders and provides 360 degrees of ıase shift between them, the degrees of phase shift at the design fre- ıency corresponding to the degrees of shaft rotation.

ɔ control the polarisation of a crossed Yagi, the antenna should be ɔunted with the elements at 45 degrees to the horizontal, and a feeder rought from each half of the antenna to the operating position. This ɔt only allows the POLARPHASER to generate electrically all modes of ɔlarisation, but improves the efficiency of the antenna by eliminating he losses caused by the mast being in the same plane as one set of ele- ents. Feeder losses are also reduced by the simple fact that the effect ve feeder cross section has been doubled.

itherto control of polarisation from the operating position has involved edious "cutting and trying" to equalise the electrical length of the eeders. The POLARPHASER eliminates this problem since with 360 degrees f phase shift available all polarisations - horizontal, vertical, circu- ar clockwise and circular anti-clockwise are all within the range of the ɔntrol knob regardless of the lengths of the feeders.

urther information can be obtained from Mr Dave Trezona, P. O. Box 929, arrismith 9880.

M S A T O R B I T A L D A T A

ORBS29

Prepared by WA2LWW and KA9Q

19Jul86

```
tellite: oscar-9
talog number: 12888
och time:        86191.48469587
 Thu Jul 10 11:37:07.723 1986 UTC
ement set:       910
clination:         97.6520 deg
 of node:         194.0832 deg
centricity:     0.0002750
g of perigee:      18.5782 deg
an anomaly:       341.5563 deg
an motion:     15.2653127? rev/day
ag rate:          7.88e-06 rev/day^2
och rev:            26452
mi major axis:   6855.304 km
om period:       94.208082 min
ogee:             481.176 km
rigee:            477.406 km
f perigee:      3112.48904762
 Thu Jul 10 11:42:47.314 1986 UTC
acon:             145.8250 MHz

tellite: oscar-10
talog number: 14129
och time:        86187.20534336
 Sun Jul  6 04:55:41.666 1986 UTC
ement set:       250
clination:         26.7107 deg
 of node:          71.4178 deg
centricity:     0.6014260
g of perigee:     125.0459 deg
an anomaly:       306.9624 deg
an motion:     2.05861774 rev/day
ag rate:         -1.04e-06 rev/day^2
och rev:             2303
mi major axis:  26104.978 km
om period:      699.498490 min
ogee:           35429.941 km
rigee:           4029.516 km
f perigee:      3108.27690918
 Sun Jul  6 06:38:44.953 1986 UTC
anslate freq:    581.0047 MHz
vert:                   1
acon:             145.8090 MHz

tellite: oscar-11
talog number: 14781
och time:        86185.63859522
 Fri Jul  4 15:12:22.627 1986 UTC
ement set:       152
clination:         98.1474 deg
 of node:         252.2488 deg
centricity:     0.0014699
Arg of perigee:    105.5988 deg
Mean anomaly:      254.6841 deg
Mean motion:    14.62059110 rev/day
Decay rate:        5.3e-07 rev/day^2
Epoch rev:           12491
Semi major axis:  7061.749 km
Anom period:     98.491297 min
Apogee:            713.425 km
Perigee:           682.664 km
Ref perigee:    3106.65360429
   Fri Jul  4 15:41:11.410 1986 UTC
Beacon:           145.8260 MHz

Satellite: rs-5
Catalog number: 12999
Epoch time:      86193.13459649
   Sat Jul 12 03:13:49.136 1986 UTC
Element set:       335
Inclination:       82.9517 deg
RA of node:        93.0895 deg
Eccentricity:   0.0013589
Arg of perigee:   357.2999 deg
Mean anomaly:       2.7942 deg
Mean motion:   12.05060959 rev/day
Decay rate:           4e-08 rev/day^2
Epoch rev:           20087
Semi major axis:  9033.807 km
Anom period:    119.496030 min
Apogee:           1666.626 km
Perigee:          1644.792 km
Ref perigee:    3114.13895240
   Sat Jul 12 03:12:59.497 1986 UTC

Satellite: rs-7
Catalog number: 13001
Epoch time:      86193.66987786
   Sat Jul 12 16:04:37.447 1986 UTC
Element set:       262
Inclination:       82.9565 deg
RA of node:        86.3220 deg
Eccentricity:   0.0021900
Arg of perigee:   273.5437 deg
Mean anomaly:       86.3112 deg
Mean motion:   12.08698583 rev/day
Decay rate:           3e-08 rev/day^2
Epoch rev:           20154
Semi major axis:  8017.669 km
Anom period:    119.136402 min
Apogee:           1678.066 km
Perigee:          1642.949 km
Ref perigee:    3114.65004220
   Sat Jul 12 15:36:03.646 1986 UTC
```

```
atellite: noaa-9
atalog number: 15427
poch time:       86193.97418194
  Sat Jul 12 23:22:49.267 1986 UTC
lement set:      102
nclination:        98.9996 deg
A of node:        152.6957 deg
ccentricity:     0.0016694
rg of perigee:     80.7921 deg
ean anomaly:      279.5136 deg
ean motion:    14.11435592 rev/day
ecay rate:        4.9e-07 rev/day^2
poch rev:            8129
emi major axis:   7229.784 km
nom period:     102.023784 min
pogee:            884.036 km
erigee:           859.897 km
ef perigee:      3114.99002148
  Sat Jul 12 23:45:37.855 1986 UTC
eacon:            137.5000 MHz

atellite: mir
atalog number: 16609
poch time:       86195.84458735
  Mon Jul 14 20:16:12.347 1986 UTC
lement set:      225
nclination:        51.6179 deg
A of node:         92.8712 deg
ccentricity:     0.0026472
rg of perigee:    335.6897 deg
ean anomaly:       24.3010 deg
ean motion:    15.74242759 rev/day
ecay rate:        6.933e-05 rev/day^2
poch rev:            2288
emi major axis:   6725.441 km
nom period:      91.472550 min
pogee:            367.327 km
erigee:           331.719 km
ef perigee:      3116.84029940
  Mon Jul 14 20:10:01.867 1986 UTC
eacon:            143.6250 MHz

atellite: salyut-7
atalog number: 13138
poch time:       86195.85741352
  Mon Jul 14 20:34:40.528 1986 UTC
lement set:      246
nclination:        51.6232 deg
A of node:         92.2336 deg
ccentricity:     0.0004255
rg of perigee:     51.7618 deg
ean anomaly:      308.3824 deg
ean motion:    15.78444243 rev/day
ecay rate:        7.903e-05 rev/day^2
poch rev:            24413
emi major axis:   6713.502 km
nom period:      91.229070 min
pogee:            346.322 km
xfs3CZ55Ref perigee:      3116.86649729
  Mon Jul 14 20:47:45.365 1986 UTC
```


SA AMSAT SHOP

Satellite Experimenters Handbook.

Members	... ...	R25-00
Non-Members	... ...	R27-50
JAS-ONE Handbook	...	R10-00
Cufflinks (gold or rhodium)	... ...	R27-50
SA AMSAT pin (gold or rhodium)	... ...	R23-50
25th Anniversary patches for wind-breakers or collection.	... ...	R15-00

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LEVEL ONE ACSSB WILL SOON BE USED ON TEST TRANSMISSIONS ON OSCAR 10 MODE B AND L.

COMPLETE KITS ARE NOW AVAILABLE FROM SA AMSAT AT R85-00, PLUS R5 POSTAGE.

SA AMSAT, P.O. BOX 13273, NORTHMEAD 1511.

-1

The linear transponder = Mode JA.

passband will be 100 kHz wide. The transponder will have an output 1 watt p.e.p. Ground stations will need an uplink power of 100 watts .r.p. The sidebands will be reversed, i.e. the uplink is LSB, the nlink is USB. There will be a 100 mW c.w. beacon switchable to PSK n needed.

ink passband	:	145,90 MHz - 146,00 MHz
nlink passband	:	435,80 MHz - 435,90 MHz
con frequency	:	435,795 MHz
nslate frequency	:	581,80 MHz

The digital transponder = Mode JD.

re will be four 145 MHz band input channels using Manchester coded FM the uplink. Ground stations will need 100 watts e.i.r.p. There will one downlink channel in the 435 MHz band using PSK, the output will be att RMS.

nnels are:

ink channel 1	:	145,850 MHz
ink Channel 2	:	145,870 MHz
ink Channel 3	:	145,890 MHz
ink Channel 4	:	145,910 MHz
nlink channel	:	435,910 MHz

data format is HDLC. The protocol is AX.25 Level 2, Version 2. The a transfer rate is 1200 bps for both uplink and downlink.

-1 will be launched into a circular low-earth orbit, which will be non synchronous and non-polar.

nch vehicle	:	H-1 2 stage rocket
nch number	:	Test Flight # 1
nch site	:	Tanegashima Is., Japan
nch date	:	August 1986
imated inclination	:	50 degrees
imated altitude	:	1 500 km
imated period	:	120 minutes
imated window per pass	:	20 minutes/pass
imated passes per day	:	8 passes/day

FINAL ORBITAL ELEMENTS FOR JAS-ONE WILL BE TRANSMITTED ON TWO NIGHTS FOLLOWING THE LAUNCH : AUGUST 8 and 9 at 20H30 SAST ON 3720 and 7080 KHz

SOUTHERN AFRICA AMSAT

P.O. Box 13273, Northmead 1511. South Africa.

PPLICATION FOR MEMBERSHIP

URNAME: CALLSIGN:

IRST NAMES:

OSTAL ADDRESS:

HOME ADDRESS:

TEL (home)_____ TEL (work)_____

AIN INTEREST:

IEMBERSHIP FEES:

STUDENT MEMBER	...	R10-00	SA AMSAT TIE	...	R12-50
ORDINARY MEMBER	...	R30-00	CUFF-LINKS (gold or rhodium-plated)	...	R27-50
SPONSOR MEMBER	...	R50-00			
GROUP MEMBERSHIP	...	R50-00	BADGES (gold or rhodium-plated)	...	R23-50

lembership year: Sept. 1 - Aug. 31.

ate:_____ Signature _____

ommittee use

Someone has to be best.

It's always been that way.
In politics, in sports, in business. Someone who's more aggressive, more courageous, more dedicated.

Take Mini-Circuits, for example, supplying RF signal-processing components worldwide.

While other companies boasted about their product reliability, we worked at it ... pioneering HTRB (high-temperature, reverse-bias) testing to screen potentially faulty mixer diodes; performing burn-in, thermal shock, and fine and gross leak testing on standard off-the-shelf units; innovating powerful in-house quality-control techniques such as mandatory requirements of unit-to-unit electrical performance repeatability. And we were the first (and still only) manufacturer of double-balanced mixers with a 3-year guarantee.

While others limited their standard catalog product line, we steadily added so today we offer the world's widest variety of off-the-shelf, immediate delivery products designed to perform to *your* specs. And this put an end to expensive, "custom" parts with their lengthy delivery delays.

While other RF signal-processing manufacturers were satisfied to offer limited data, Mini-Circuits invested six engineering man years in order to provide customers with exclusive Computer-Automated Performance Data (CAPD) ... the most detailed information ever published for standard catalog items.

While other firms were increasing prices and debating the wisdom of applying computer-aided systems for parts procurement, delivery scheduling, and automating manufacturing and test, we were busy putting such systems into operation. As a consequence, more than 95% of our product lin has not been given a price increase during the past ten years. We can't guarantee how long thi price freeze will continue, but we pledge our commitment to further maximize all of our products price/performance goals.

Quality, performance, delivery, and low cost. Mini-Circuits ... dedicated to finding new ways and setting higher standards.

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"THE SATELLITE TWINS"

2-METRES 70-CENTIMETRES
TS-711E, TS-811E

★25 WATTS
★COMPACT DESIGN
★DUAL VFO'S
★40 MEMORIES

RPT switches
- TONE: Activates 1750 Hz tone circuit
- OFFSET: Used to select TX OFFSET ± 600 kHz. (TS-711E)

MODE/Ten keys
- MODE: Mode selection (FM, USB, LCB, CW) accomplished through use of mode keys, with an adjacent LED. The first letter of the mode is announced in International Morse Code.
- AUTO: Automatically selects the appropriate mode, depending on the frequency.
- SCAN: Used to activate or stop scan.
- M IN: Used to store data in memory channel.
- REV & LOCK: Used to lock frequency out of dial and key board operation. In SPLIT memory channels transpose the receive and transmit frequencies during VFO offset operation.
- AL: Alert
- CH. S: Provided to facilitate selection of the memory channel in which the operator wished to store data.
- TEN KEY: Used when setting digital code and call sign.

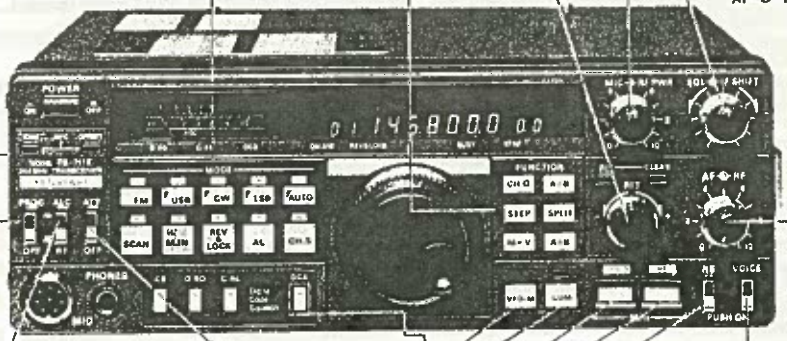
FUNCTION switches
- CH Q: Tuning characteristic varies from conventional VFO feel to stepping action
- A/B: VFO A and B
- STEP: Tuning step frequency in VFO
- SPLIT: Allows receive/transmit operation of VFO A and B only in VFO mode
- A▸B: Permits quick shifting of the 'B' VFO data to the 'A' VFO, or vice versa.
- M▸V: Used to transfer memory data to the active VFO

RIT control: Shift the receive frequency in 10 Hz steps within a range of ± 9.9 kHz

MIC — RF PWR controls

SQL — IF SHIFT controls

AF — RF controls



ALC/RF: Used to select RF or ALC meter.

ATT: Attenuator (- 20 db) (TS-711E)

PROC: Used to increase average modulation ration in FM mode and to increase talk power in SSB mode.

NB (Noise Blanker)

DOWN/UP: Shifts 1 MHz up/down.

COM: Preset for COM channel

VFO/M: Used to switch alternately between VFO and memory channel

VOICE: Announces the frequency or digital code when an optional VS-1 is installed inside the cabinet

DCS switches
- DCS: Used to activate DCS system
- D. SQ: Used to activate digital code squelch with DCS switch-ON
- C. AL: Confirmed by sounding of triple beep tones when the digital code squelch opens /Used to set up call sign with CS switch-ON
- CS: Used when setting digital code.

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